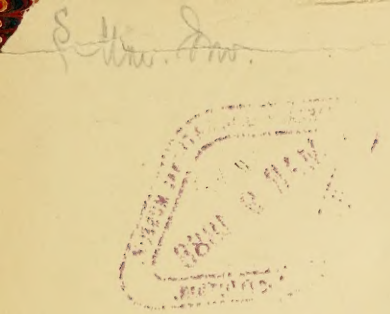

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MORGAN EXPEDITIONS, 1870-71.

CH. FRED. HARTT, IN CHARGE.

ON THE

DEVONIAN TRILOBITES AND MOLLUSKS

OF

ERERÉ, PROVINCE OF PARÁ, BRAZIL.

By PROF. CH. FRED. HARTT,

AND

RICHARD RATHBUN.

[Reprinted from the Annals of the Lyceum of Natural History, N. Y., Vol. xi, May, 1875.]

XIII.—*Morgan Expeditions*, 1870–'71: *On the Devonian Trilobites and Mollusks of Ereré, Province of Pará, Brazil.*

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Read March 9, 1875.

We have given in this paper descriptions of the trilobites and of all the species of mollusks, not including the brachiopods, collected by the parties of the Morgan Expeditions, in 1870 and '71, from the Devonian rocks of the plain around the little village of Ereré. In the Bulletin of the Buffalo Society of Natural Science, for January, 1874, Vol. I, No. 4, Prof. Hartt has described at length the geography and geology of the Ereré-Monte-Alegre district, in which occur the fossiliferous Devonian beds forming the plain of Ereré. These beds consist of thin horizontal layers of white and reddish sandstones, interstratified more or less with shales. Both the sandstones and the shales contain at a few points an abundance of fossils, closely related to, and in some cases identical with, forms characteristic of the middle Devonian rocks of North America. The brachiopods, the most abundant fossils in the Ereré Devonian, were described by Mr. Rathbun in the work above cited, in a paper immediately following that of Prof. Hartt. There then remained for description the mollusks, including six forms of gasteropods and eight of lamellibranchs, with a single form of *Tentaculites*, two forms of trilobites of the genera *Dalmania* and *Homalonotus*, both probably new, and a number of obscure forms, many of which are entirely unrecognizable.

The mollusks and trilobites in the Devonian at Ereré are confined entirely to the sandstone, no traces of either having

been found in the shale, in which the only recognizable forms are the very abundant *Discina* and two species of *Lingula*, already described.

By reference to the paper on the Brachiopoda of Ereré, mentioned above, it will be seen that many of the forms there described are identical with species of the Devonian age, more especially the Hamilton group, of New York state, and that most of the remaining forms have closely related ones in these same deposits of North America. The close relation in horizon of the middle Devonian of New York and the formations of the plain of Ereré was thus demonstrated. The study of the mollusks has greatly strengthened the proof of this relationship, for several of the forms of mollusks from Ereré have proved identical with forms recently described from the Hamilton group of New York by Prof. Hall, and possibly others, now apparently distinct, may also turn out identical with more extended collections. All the genera represented, with a single exception, are common to the Devonian elsewhere. We are under very many obligations to Prof. James Hall of Albany, N. Y., for identifying for us many of the following genera, some of which have been recently proposed by him. He also made a comparison of the species with the New York forms contained in his collection, and it was with his aid that we were enabled to unite the three forms, as hereinafter indicated. To Mr. R. P. Whitfield, of Albany, we are also much indebted for assistance in our work.

TRILOBITES.

Genus DALMANIA, Emmrich.

Dalmania Paituna, sp. nov.

Animal of medium size, sometimes quite large: test very tumid, and with the different lobes and segments sharply defined.

Buckler crescent-shaped; greatest breadth about one and one-fourth the greatest length, and nearly twice the length of the glabella; in front sub-acuminate or bluntly sub-angular, the margins on either side diverg-

ing at first at an angle of about 120°, and curving moderately and regularly; posterior lateral angle on either side produced backward in an acute spine. On each side of the frontal lobe the margins sometimes form nearly straight lines. The entire margin forms a curve, nearly equal to half an ellipse, in which the relation between the two diameters is about as 2 to 3. A specimen rather below the medium size measures: greatest length, 14·5^{mm}; greatest width, about 20^{mm}. A larger specimen has a length of about 21^{mm}.

Glabella very prominent, slightly flattened on top, bounded by deep axal furrows, sub-pentagonal in outline, and rounded or sub-angular in front; widest just back of the middle of the frontal lobe, or at about one-third the length of the glabella from the front. Thence backward the glabella narrows regularly, the width at occipital furrow being a little more than half the length of the glabella. Frontal lobe rounded or sub-angular at front and sides and very convex, curving strongly downward toward the margins of the head, and sometimes obliquely flattened on either side in front. Its length equals about the united length of the four succeeding pairs of lobes, and a little more than two-thirds its own width. Frontal furrows wider than middle and basal furrows. Originating at a distance from the front equal to about one-third the length of the entire glabella, they run inward and backward at a strong angle, terminating near the middle of axis. They reach a little more than one-third across the glabella. Upper and middle lobes wider and more prominent than the basal lobe. Middle furrows situated at a distance from the front equal to about 3–5 the length of glabella, deep and rather narrow, perpendicular to axis, and extending inward quite as far as the frontal furrows. Basal furrows deep, curving a little forward, and reaching to about one-third the distance across glabella, or slightly farther than do the middle furrows. Basal lobes narrow and much less prominent than the other lobes. Occipital furrow deep, broad and rounded. Occipital ring broad, strongly arched vertically and sub-angular behind. The highest part of the glabella is situated at a point about between the middle furrows. On the median line, and slightly in advance of frontal furrows, is a minute, more or less distinct depression, usually more marked in the internal cast.

Limb forming a blunt, rounded or sub-angular projection in front of glabella, but narrowing down to a mere line before reaching the axal furrows. Cheeks very convex, with a strong convex slope toward the margins; slope toward neck and axal furrows abrupt. The limb increases rather rapidly in size going backward from the axal furrows, being separated from cheek lobe by a well defined, broad furrow. The occipital furrow is inclined slightly backward, and is deep and well defined, not being extended into the nuchal spine, which last is short, acuminate and not differentiated from cheek. Length of spine, measuring from angle formed by lateral and occipital furrows, equal to about half the length of glabella. Spines directed slightly outward. Posterior mar-

ginal fold strongly convex and of moderate width. Eyes large and very prominent, situated exactly opposite outer extremities of anterior and median lobes. In none of the specimens in the collection are they sufficiently well preserved to allow of detailed description.

A Hypostome, probably of this species, is sub-quadrate in form and strongly convex. The front margin is strongly arched and slightly subangular. On each side it is produced in a short acuminate spine, extending directly outward. The sides are nearly straight and incline slightly toward one another in going backward. The body of the hypostome is very convex and abruptly separated from a flattened margin. The outline of the convex portion forms a very regular curve as follows: beginning at the anterior lateral angles it runs obliquely backward and inward, the flattened margin widening gradually; posteriorly with a regular arch it extends apparently nearly to the margin. The whole hypostome is strongly arched, transversely and vertically. The abrupt margin of central portion increases in height going backward. This specimen measures 7^{mm} in length and about 10^{mm} in greatest width. A fragment of a larger specimen of hypostome, having a length of 21^{mm}, was also obtained from the same bed as the above, and, although differing from it somewhat in appearance, may belong to an older specimen of the same species.

Pygidium triangular, with curved sides, and very convex. Axis narrow, prominent, regularly rounded from side to side, and extending about 3-4 length of shield; width in front apparently equal to 1-3 width of shield. It decreases slightly in width and gradually in height posteriorly, where it ends abruptly, the extremity being rounded and convex; width in front about one and one-half to two times the width behind. In one large specimen the axis shows 14 rings, the anterior of which, in the internal mould, are prominent, rounded, and separated by furrows of rather greater width; but they become very small and indistinct posteriorly, the last three or four being crowded together. In none of the specimens collected is the articular ring preserved, but several of these show 11 to 13 rings. Lateral lobes convex, but generally of much less elevation than the axis; margin slightly flattened. Furrows deep and extending to the margin in all but the last four or five rings. The segments are rounded near the axis, but are flattened and much broader toward the margin. The anterior one is nearly at right angles with the axis, but they become more strongly inclined posteriorly. On the first segments the sutures are faint and on the posterior ones not observable. The margin is denticulate, the terminations of each segment being apparently blunt and obliquely rounded or angular. Posterior part of pygidium, behind axis, highly inclined, rounded and smooth; posterior margin concave, arched and slightly turned up along the edge. A specimen of medium size measures in length, about 15^{mm}, in width, 14^{mm}. A very large specimen has a length of 32^{mm}.

A few detached segments, that may belong to the thorax, were found, but they are unsatisfactory for determination.

The first distinguishing feature of this species lies in the great prominence of the test, none of the forms, with which we have compared it, approaching it at all in convexity. This difference of character is supplemented by many others. From *Dalmania Boothii*, of the Hamilton group of New York, the only abundant form known in beds corresponding most nearly in age to the Ereré Devonian, it differs, among other features, in the greater proportionate length of the middle of the head, in the more gradual backward narrowing of the glabella, and in the greater length of the frontal lobe, which is generally more angular in front in the latter form.

This beautiful species occurs somewhat abundantly in the Devonian sandstone at Ereré, associated with *Spirifera Pedroana*, etc. The specific name is given in allusion to a mythical personage, after whom the Serra of Paitúna in the vicinity received its name.

Genus HOMALONOTUS, Kœnig.

Homalonotus Oiara, sp. nov.

There was obtained from the Devonian sandstone at Ereré, a single fragment of the head of a large trilobite, which belongs to this genus. It is very distinct from any other form yet known, but too imperfect to admit of proper description. It differs from *Homalonotus Dekayi*, Van., apparently, in the fact that the margins of the glabella are more concave than in the latter form, and the eyes are placed farther forward. We have ventured to rank it as a new species, naming it after the Tupi water maiden. Associated with the last species above described, *Dalmania Paitúna*.

GASTEROPODA.

Genus PLEUROTOMARIA, Defrance.

Pleurotomaria Rochana, sp. nov.

Shell quite small; outline, as seen in front and hind view, a rhomboid, of which two opposing sides are about twice the length of the other two

sides. Height less than the breadth; spire very depressed-conical; apical angle somewhat greater than a right angle. Volutions about three in number, the last angular and carinate along the middle, with the upper surface flattened, or curving very slightly from the suture to the median carina. The upper surfaces of all the volutions, from the apex to the carina of last volution, lie in nearly the same plane and are separated by a shallow suture; lower side of the body volution slightly more convex than the upper. Aperture and surface markings not preserved. This is a very small species of *Pleurotomaria*, one specimen measuring about 8.5 mm in length, and 11 mm in breadth.

Only a few specimens of this species have been obtained, and none of these are in a very perfect condition. Associated with *Nuculites Nyssa*, *Streptorhynchus Agassizii*, etc., in the Devonian sandstone of Ereré, Prov. of Pará, Brazil.

Named in honor of Tenente Rocha, commandant of the Marine Arsenal at Pará, to whom the expedition of 1870 was indebted for the fitting out of the steamer Jurupensem.

Genus HOLOPEA, Hall.

Holopea Furmaniana, sp. nov.

Shell rather above the medium size, obliquely sub-conical in front view, with the length and breadth nearly equal. Volutions about three or four in number, very prominent and well rounded. They increase quite rapidly in size from the very small apex, the last one being ventricose and sometimes slightly flattened on the top near the suture, which is rather deep and acute-angular. Aperture slightly oblique, oval in outline and a little reflected on the lower side. Surface, as determined by external moulds, smooth. One specimen of average size measures: length and breadth each, about 17 mm; but many specimens are larger than this.

All the specimens of this form, so far obtained, are in the condition of moulds of the interior and exterior. In the internal mould there is a small umbilicus, probably due entirely to the removal of the columella. This form is easily recognized by its regular and well rounded volutions and low spire, the volutions commencing of very small size and increasing rapidly and regularly to the aperture. So far as we are aware the genus *Holopea* has not been recognized from the Devonian before; but the smooth exterior of this form

precludes its being placed in the genus *Pleurotomaria*, to which it might seem to be related from the shape and appearance of the internal mould alone.

Very abundant in the Devonian sandstone of Ereré, Prov. of Pará, Brazil; associated with *Spirifera Pedroana*, *Nuculites Nyssa*, etc.

Dedicated to Mr. Furman of Pará, a gentleman to whom both expeditions are deeply indebted.

Genus PLATYCERAS, Conrad.

Platyceras symmetricum.

Platyceras symmetricum, Hall. 15th. Ann. Rep. St. Cab., N. Y., 1862, p. 34.

Description of the Ereré form:— Shell small, argonautiform in side view, very slightly elongated and somewhat laterally compressed. From the apex, which is minute and twisted very slightly to the right of the median line, the shell increases very rapidly in size, the ventral side of the body volution passing tangentically for a short distance beyond the last preceding volution. Volutions about one and one-half in number, the outer one, small and much compressed where it commences, but becoming gradually less compressed and more fully rounded toward the aperture, enlarging rapidly at the same time. The aperture is oval in outline, with the sinistro-dextral diameter a little less than the dorso-ventral. The margin is apparently sinuous, but is defective in the specimen. Exterior surface of shell not preserved. Surface of internal mould of body volution not very irregular, somewhat rugose and traversed near the front by numerous, rather indistinct growth lines, which bear on each side a few deep, rounded flexures. To these flexures a few short, irregular, longitudinal undulations near the aperture appear to correspond. There is a slight prominence, probably the impression of the base of a spine, just on the left of the dorsal line, midway between the aperture and the beginning of the outer volution. Dimensions: greatest length from anterior margin of aperture, 19 mm; dorso-ventral diameter of aperture, 13.5 mm; sinistro-dextral diameter of same, 12 mm.

Only one specimen of *Platyceras*, the one described above, was obtained from Ereré. It agrees with *P. symmetricum* of Hall, Hamilton group, N. Y., in being symmetrical and in having the same number and character of volutions; but it is much smaller than any specimen of *P. symmetricum* from the Hamilton group which we have seen, and more per-

feet specimens, preserving the shell, may show it to be distinct from that species.

From the Devonian sandstone of Ereré, Prov. of Pará, Brazil; associated with *Spirifera Pedroana*, etc.

Genus BELLEROPHON, Montfort.

Bellerophon Morganianus, sp. nov.

Shell of small to medium size, subglobose, with the umbilical openings small but rather deep. Body volution generally somewhat broadly flattened along the back, sometimes moderately rounded and curving abruptly to the umbilicus. It increases rapidly in size toward the aperture, where it expands quite abruptly, making the aperture large and apparently transversely sub-elliptical in outline. Surface covered with minute, rounded, transverse, parallel, raised lines, which first curve slightly forward from an indistinct, median dorsal band, and then extend nearly directly to the edge of the umbilical openings. Of a nearly perfect specimen of medium size, the greatest length from the outer edge of the aperture is about 17 mm; sinistro-dextral diameter of aperture of same specimen, about 19 mm.

This Brazilian species of *Bellerophon* appears to be closely related to *B. leda* of Hall, Hamilton group, New York, and is of about the same size as that species. The body volution of *B. Morganianus* is, however, generally larger where it commences than is the case in *B. leda*, and the revolving raised lines are entirely wanting in the former species.

Obtained in great abundance from the Devonian sandstone of Ereré, Prov. of Pará, Brazil; associated with *Spirifera Pedroana*, etc.

Dedicated respectfully to Mr. Edwin B. Morgan, of Aurora, N. Y.

Bellerophon Coutinhoanus, sp. nov.

Shell rather small, subglobose, trilobed. The outer volution increases rapidly toward the aperture, and is divided into three longitudinal lobes, of which the middle or dorsal lobe is about two-thirds the width of the whorl itself, and is prominent, sharply defined at its margins and very regularly rounded. The lateral lobes curve regularly and quite abruptly from the dorsal lobe to the umbilical openings. Size of the most perfect specimen, which is not, however, the largest one obtained: greatest length from near the outer edge of the aperture, about 15 mm; width of the outer volution near the aperture, nearly 15 mm.

Although a number of specimens of this species of *Bellerophon* were obtained from Ereré, the aperture is not preserved in any of them, and the umbilical openings, if such existed, are covered up by the rock in every case. The specimens are all of internal moulds and the surface markings are not retained. *B. Coutinhoanus* is very closely allied to *B. trilobatus* of Sow., Devonian of Europe, more especially to the variety *tumidus*, from which, however, it differs in having the dorsal lobe broader, less prominent, and more flattened along the top, with its margins more distinctly defined.

From the Devonian sandstone of Ereré, Prov. of Pará, Brazil; associated with *Nuculites Nyssa*, etc.

Respectfully dedicated to Dr. Silva de Coutinho, Rio de Janeiro, Brazil.

Bellerophon Gilletianus, sp. nov.

Shell very small, laterally compressed, somewhat lenticular in form and sub-circular in outline; umbilical openings of medium size, deep. The outer volution commences very small, somewhat compressed and more or less angular on the median dorsal line, and increases rapidly in prominence but quite gradually in width, becoming more and more strongly angular toward the aperture, where it is but slightly expanded. The summit of the mesial prominence is often well rounded, but sometimes acute, while on each side is generally a very shallow accompanying groove, growing more pronounced toward the aperture, and which gives to the shell near the mouth a somewhat trilobed appearance.

The surface of the shell is marked by numerous, very fine, rounded, thread-like, concentric raised lines, which arch very strongly backward from the umbilici to the median dorsal line, where the corresponding ones on each side unite in a curve. Of the largest specimen obtained, the greatest diameter, which is from the outer margin of the aperture to the opposite side of the shell, is about 10 mm; width of the body volution near the aperture, about 5 mm. Most of the specimens, however, are much smaller than this.

B. rotiformis of De Kon., Europe, resembles the species just described in size and general appearance, but it is more lenticular in shape and the whorls increase more rapidly in size. The umbilical openings are also smaller and the slope toward them is much less abrupt.

Moderately abundant in the Devonian sandstone of Ereré, Prov. of Pará, Brazil; associated with *Nuculites Nyssa*, *Spirifera Pedroana*, etc.

Named after M. Léon Gillet, Prof. Hartt's able and obliging agent at Pará.

LAMELLIBRANCHIATA.

Genus NUCULITES, Conrad.

Nuculites Nyssa.

Nuculites Nyssa, Hall. Lamell. Shells of the U. Held., Ham. and Chem. Groups, etc., 1869. (Preparatory for the Palæontology of N. Y.)

Description of Ereré specimens:—Shell of medium size, longitudinally sub-ovate or sub-triangular in outline, and of moderate convexity. Anterior margin well rounded and narrower than the posterior. The dorsal margin, curving slightly, extends obliquely backwards from the beak to the posterior extremity of the shell, a short distance above the termination of the median antero-posterior diameter. The ventral margin is moderately rounded and, together with the anterior and posterior margins, forms an elliptical curve. Beaks about one-fourth the length from the anterior extremity, with the apices acute and strongly incurved to the hinge line. Valves most convex at a point just above and anterior to the middle. The surface arches rapidly and more or less regularly from the ventral margin to the beak, but is generally a little more strongly curved in the umbonal region, and is broadly flattened, rounding suddenly to the dorsal margin. The slope toward the posterior margin is convex and more abrupt than toward the ventral margin; toward the anterior margin it is still more abrupt, becoming gradually concave near the beaks. The septum, curving very slightly, and with its concave side forward, extends down nearly two-thirds the shell height, cutting the antero-posterior diameter at about one-fourth its length from the front. Surface smooth or marked with a few indistinct lines of growth. Length, 24 mm; height, 17 mm; depth of single valve, 5 mm. Specimens of larger size are numerous.

This species of *Nuculites*, which is the most common lamellibranch at Ereré, proves to be identical with *N. Nyssa* of Hall, found in the Hamilton group, New York.

We are indebted to Prof. Hall for the identification of the forms from the two places.

Abundant in the Devonian sandstone of Ereré, Prov. of Pará, Brazil, with *Spirifera Pedroana*, *Streptorhynchus Agassizii*, etc.

Nuculites Ererensis, sp. nov.

Shell small, elongate, nearly twice as long as high, sub-elliptical in outline, the margins forming quite a regular elliptical curve, broken by the slight upward extension of the beaks. Dorsal margin oblique and nearly straight. Beaks situated about one-third the length from the anterior margin, small, only slightly incurved, and apparently not reaching to the hinge line. The convexity of the valves is moderate, being greatest just below the umbonal region. The septum extends downwards for about three-fifths the height of the valves, and intersects the antero-posterior diameter at a little less than one-third its length from the front. Length, 13^{mm}; height, 8^{mm}; depth of single valve, nearly 3^{mm}.

This species of *Nuculites* is readily distinguished from the last one above described, *N. Nyssa* of Hall, by its elongate form and nearly elliptical outline, and by the absence of any flattening along the middle. Only two specimens have yet been obtained. These are both internal moulds of the left valve, and the surface markings are not preserved upon them.

Found, with *Spirifera Pedroana*, etc., in the Devonian sandstone of Ereré, Prov. of Pará, Brazil.

Genus GRAMMYSIA, De Verneuil.

Grammysia (Pholadella?) parallela.

Grammysia parallela, Hall. Lamell. Shells of the U. Held., Ham. and Chem. Groups, etc., 1869. (Preparatory for the Palæontology of N. Y.)

Shell small, elongate, about two-thirds as high as long, with the greatest height at the beaks. Valves moderately convex, the surface arching strongly from the beaks to the ventral margin, but being rather more abruptly curved in the upper portion. The beaks are situated at about one-fourth or one-fifth the length of the shell from the anterior extremity, and project but little above the hinge margin; they are small, rather strongly arcuate and turned somewhat abruptly forward, with the apices acute and contiguous. Dorsal margin straight and extending directly backward. The anterior margin extends obliquely forward in its upper half, forming at the beaks an angle of about 135° with the dorsal margin, and is slightly

concave; it rounds somewhat abruptly to the ventral margin below, which is moderately curved anteriorly, but becomes nearly straight and subparallel with the dorsal margin along the middle of the shell. Posteriorly the ventral margin appears to round up more or less strongly toward the dorsal margin, but in none of the specimens obtained, is the posterior extremity of the shell perfectly preserved. From a line, extending obliquely across the valves, from just behind the beaks to the lower posterior extremity of the shell, and forming an angle of about 30° with the dorsal margin, the surface curves moderately and quite regularly to the anterior margin, and is traversed by about 10 or 12 low, wide, rounded, concentric undulations, which decrease in size from the ventral margin toward the beaks, where they are quite small. The lower ones round up quite abruptly in front, but are more gently curved along the middle. Posterior to the oblique line, above mentioned, the surface descends abruptly, and with a concave slope, to the hinge line and the posterior extremity, and is smooth in the moulds. Length, about 16 mm; height, 10.5 mm; depth of each valve, 3 mm.

Prof. Hall has identified this Brazilian form with his *Grammysia parallela* of the Hamilton group, New York, *loc. cit.;* but he expresses a doubt as to whether the species is a true *Grammysia*, or belongs to his new genus *Pholadella*, published in 1869.

Only a few specimens of this pretty form were obtained from the Devonian sandstone of Ereré, Prov. of Pará, Brazil, associated with *Spirifera Pedroana*, etc.

Genus EDMONDIA, De Koninck.

Edmondia Pondiana, sp. nov.

Shell below the medium size, elongate, nearly two-thirds as high as long, sub-elliptical in outline and moderately ventricose, with the greatest convexity in the lower posterior part of the umbonal region. Anterior end much narrower than the posterior, well rounded and prominent, the margin uniting by a moderate curve with the ventral margin, which, along the middle one-half of the shell, is quite straight and nearly parallel with the dorsal margin; posterior end strongly rounded, and apparently slightly truncate in its lower portion; dorsal margin straight and about one-half the length of the shell. Beaks situated at a little less than one-third the length from the front, broad, very prominent, and strongly incurved toward the hinge margin and the front, nearly or quite contiguous, and projecting a moderate distance above the hinge. The umbonal region is obliquely flattened, the flattened surface inclining anteriorly. This flattening, which commences on the beak, appears to

extend downward, and somewhat obliquely backward, across the valve; but it becomes less and less perceptible toward the ventral margin, toward which the slope, for nearly the whole height of the valve, near the middle, is only slightly curved; toward the front, the slope is much stronger and it becomes concave in front of, and beneath, the beaks. Commencing at the anterior margin, the surface rises at a moderately strong angle for one-fifth the shell length, more or less, when, the angle of ascent becoming gradually less, it continues to rise with very little curvature toward an oblique line, extending across the valve from the posterior side of the beak to the lower posterior extremity of the shell. Along this line the valve rounds over toward the dorsal and posterior margins, quite gradually in the lower part, but more and more abruptly near the beak, the curve, from the point of greatest convexity of the valve toward the posterior end of the hinge margin, being abrupt and slightly sigmoidal. Exterior surface unknown. Length, 22^{mm}; height, 14^{mm}; convexity of single valve, 5.5^{mm}.

This species is founded on a single specimen, a very perfect internal mould of the left valve; but one or two much smaller specimens, probably referable to the same species, were also obtained from Ereré. From the Devonian sandstone of Ereré, Prov. of Pará, Brazil; associated with *Spirifera Pedroana*, etc.

(Named after my friends, Mr. Fred. Pond, American Consul at Pará, and his brother, Mr. Thos. Pond, to whom I am indebted for a thousand favors. C. F. H.)

Edmondia Sylvana, sp. nov.

Shell small; length a little more than one and one-half times the height; outline apparently sub-elliptical. Valves moderately convex and nearly symmetrical, most prominent in the umbonal region. Beaks small, subcentral and obtuse in the moulds, incurving very little and hardly projecting above the plane of the hinge, between which and the apices of the beak is quite a space. The dorsal margin is regularly curved, and rounds down on each side of the beak to the anterior and posterior margins, of which the former seems to be the narrower, and is more regularly rounded than the latter; ventral margin nearly straight along the middle. The surface of the valves arches very strongly and quite regularly from the beaks to the ventral margin, while the curvature along the antero-posterior diameter is moderate and nearly regular. Length, 17^{mm}; height, 10^{mm}; convexity of single valve, 4^{mm}.

Although only a single specimen of this species, which has been referred with some doubt to *Edmondia*, has been obtained, and that is not a very perfect one, it has been possible from it to make out the principal characters of the species quite accurately. It is readily distinguished from all the other species of lamellibranchs yet found at Ereré, by the nearly symmetrical valves and sub-central beaks.

From the Devonian sandstone, Ereré, Prov. of Pará, Brazil, with *Spirifera Pedroana*, etc.

[Named in honor of my friend, Senhor José Gualdino da Silva, of Pará, to whom I am under many obligations. C. F. H.]

Genus MODIOMORPHA, Hall.

Modiomorpha Pimentana, sp. nov.

Shell of moderate size, elongate, sub-quadrilateral in outline. From the beaks, which are placed at less than one-fourth the length from the front, the height increases very gradually to the posterior end of the hinge margin, which last equals about three-fifths the length of the shell and is straight; height of shell at beak about five-sixths that at end of hinge margin. Anterior margin straight and oblique for about one-half its length, forming at the beak an angle of about 135° with the dorsal margin. It rounds abruptly to the ventral margin, which, in its posterior three-fourths, is nearly straight. The posterior margin is slightly convex, and extends obliquely backward from the dorsal margin, with which it forms an angle equal to about that at the beaks, and curves abruptly to the ventral margin. Beaks very small, obtuse and not produced above the hinge line. The valves are quite convex, the surface rising rapidly from the ventral and anterior margins on the one side, and from the dorsal and posterior margins on the other, toward a line running obliquely across the valves from the beaks to the lower posterior extremity. Along this line the valves are sometimes angular, at others they are regularly and strongly rounded; generally, however, they are angular near the beaks and become gradually rounded and flattened posteriorly. Above, the surface slopes to the dorsal margin very abruptly and is concave just behind the beaks, but the slope becomes more and more gradual toward the posterior extremity, and, from very slightly concave at first, it changes to very slightly convex posteriorly. The lower and anterior portion of the valves is sometimes broadly flattened. Surface marked with numerous concentric lines of growth. Length, 30^{mm}; height, 16^{mm}; depth of single valve, 5^{mm}. These dimensions are of the largest specimen found; most of the specimens are much smaller.

This form of *Modiomorpha*, which is quite abundant at Ereré, although very constant in its outline, varies considerably in its surface characters, as described above. The specimens obtained are all moulds of the interior and exterior. Associated with *Nuculites Nyssa*, *Spirifera Pedroana*, etc., in the Devonian sandstone of Ereré, Prov. of Pará, Brazil.

Named in honor of Senhor Pimenta Buenó of Para, to whom the expeditions are under obligations.

Genus PALÆANEILO, Hall.

Palæaneilo sulcata, sp. nov.

Shell of moderate size, elongate, slightly gibbous, and apparently subelliptical in outline, with the height less than two-thirds the length. Dorsal margin inclining slightly downward in extending backward from the beaks. The anterior margin appears to be slightly concave, for about one-third its length from the beaks, and forms an angle of nearly 120° with the dorsal margin; in its lower two-thirds it is well and regularly rounded. Ventral margin nearly straight and suddenly indented toward the posterior extremity of the shell, which is imperfect in all the specimens of this species yet obtained. Beaks situated at a distance from the front, equal to a little less than half the height of the shell, quite prominent and incurved to the hinge line. The valves are most convex just above and anterior to the middle, with the surface arching quite strongly and regularly, the curvature, however, increasing somewhat in strength, from the ventral margin to the beaks. A rather deep and well marked sinus commences in each valve on the posterior side of the beak, where it is very small, and extends obliquely across the valve to the ventral margin, near the posterior extremity of the shell, increasing gradually in size at the same time, the margin being deeply indented by it. The anterior edge of the sinus is quite abrupt and forms a slight fold on the surface of the valve; it makes an angle of about 30° with the dorsal margin of the shell; the posterior edge rounds over gradually. From the anterior margin of the valve the surface rounds up gradually for a short distance, and then extends with very little curvature to the sinus. Surface of mould smooth. Length, about 17 mm; height, 11·5 mm; depth of each valve, 3·5 mm.

This species of lamellibranch has the external characters of the genus *Palæaneilo*, but the specimens representing it are not in a condition to show the character of the hinge,

which is crenulated in that genus. Only a few specimens have been obtained.

From the Devonian sandstone of Ereré, Prov. of Pará, Brazil; associated with *Streptorhynchus Agassizii*, etc.

Palæaneilo? simplex, sp. nov.

Shell of medium size, elongate, quite regularly sub-elliptical in outline and of moderate convexity; height about two-thirds the length. Anterior margin not quite as high as the posterior; both anterior and posterior margins regularly and quite strongly rounded, and passing gradually into the ventral margin, which is regularly and moderately rounded. The dorsal margin is nearly straight and extends directly backwards from the beak; its length is less than one-half that of the shell. Beaks situated at about one-third the length of the shell from the anterior end, quite small, rather strongly incurved to the plane of the hinge, and slightly elevated above the hinge margin, with the apices acute. The point of greatest convexity of the valves is just above the middle. The curvature of the surface from the ventral margin to the beaks is moderate and nearly regular, growing gradually stronger, however, toward the beaks. The curvature along the antero-posterior diameter is quite moderate and regular, the slopes toward the anterior and posterior margins from the middle being sub-equal. Toward the dorsal margin the slope is moderate posteriorly, but grows gradually stronger as the beaks are approached, just behind which it is very abrupt. Immediately in front of the beaks the surface is slightly concave. Surface markings unknown; the surface of the internal moulds is quite smooth. Length, 16 mm; height, 12 mm; depth of single valve, 3 mm.

The above description of this form was made from a single, very perfect specimen, an internal mould of the left valve, in which, however, the characters of the hinge are not preserved. The generic relations of the species are thus rendered doubtful; but it agrees externally with Prof. Hall's genus *Palæaneilo* in which we place it provisionally. Besides the single specimen just mentioned, there are four or five other specimens of lamellibranchs from Ereré, which apparently belong to this same species. In them the beak is sometimes more acute, and the curvature of the surface varies slightly. In all the other characters they agree quite perfectly. This form of *Palæaneilo*

is readily distinguished from *P. sulcata*, by the regular curvature of the surface from the anterior to the posterior end, and by the absence of a sinus.

From the Devonian sandstone of Ereré, Prov. of Pará, Brazil; associated with *Spirifera Pedroana*, etc.

Genus TENTACULITES, Schlotheim.

Tentaculites Eldredgianus, sp. nov.

Shell small, rather long, straight, circular in cross-section, at least 1^{mm} in diameter at the larger end, and tapering very gradually to an acute point. Length of the most perfect specimen, a fragment, about 16^{mm}. Annulations narrow, quite prominent, and angular or slightly rounded on the summit; the interspaces are generally about twice as wide as the annulations, though they vary somewhat in width, and are flattened or a little rounded in the bottom; they are ornamented by fine annular raised lines, of which there are about four or five in each interspace, near the larger end of the specimen. The annulations decrease in size, but become more numerous toward the apex. There are about 5 to 7 in the space of 3^{mm} near the large end.

The specimens of this species, so far obtained, are from the sandstone, in which they exist as moulds of the exterior surface, generally filled up with clay or sandy material. The moulds usually preserve the impression of the annulations very sharply; the annular raised lines, however, are seldom preserved. The casts formed by the filling up of the moulds are never exact copies, but in them the annulations are almost always low and rounded. The full length is not preserved in any of the specimens obtained, but it was probably not much greater than 16^{mm}. Although the distance between the annulations varies, the variation is never very great, and is generally regular through the same specimen, the interspaces becoming gradually narrower toward the apex.

From the sandstone of the Devonian age, Ereré, Prov. of Pará, Brazil; associated with *Spirifera Pedroana*, etc.

Dedicated to Mr. Rolfe Eldredge, one of Prof. Hartt's companions at Ereré, on his expedition of 1870.

Among the more obscure remains obtained from the Devonian sandstone beds at Ereré, and which it is impossible from their imperfect condition to properly identify, are fragments of crinoidal columns, the valves of a form which appears to be related to *Beyrichia*, M'Coy, fragments of wood, etc. They are all, however, in such a poor state of preservation, that it would be unwise to attempt anything beyond a mere notice of their appearance. The crinoidal remains occur as impressions of the detached disks of the columns, which are small and thin, and it is seldom that more than two or three of the disks are found together. The central canal is generally replaced by sandy material, but none of the surface markings are retained. Diameter of disks, about 2·5 to 3^{mm}; thickness of each, about ·5^{mm}. The test of *Beyrichia* (?) is small, sub-ovate in outline, with a slight depression near one end. The surface, though imperfect in all the specimens obtained, seems to have been granulose. Diameter of a medium specimen, 2^{mm}. The remains that have been referred to with doubt as plants have no definite or describable shapes and are probably fucoidal. Many of the other fragments obtained will undoubtedly be explained with the aid of new collections from the same locality.

[Printed at the SALEM PRESS, May, 1875.]

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